Microdroplet electrowetting actuation on flexible paper-based lab on a chip

ABSTRACT

This paper presents the microdroplets electrowetting causing by the voltage actuation on the flexible lab on a chip. The electrode is made of a thin Aluminium (Al) film while the lab on a chip substrate is made from the cellulose paper, which is flexible. Consistently in this work the microdroplet samples of 5 µl from Potassium Chloride (KCl) is experimented on top of the electrodes. It is shown that the flexible paper-based lab on a EW chip has fulfilled the Lippmann's equation where the higher the voltage supply, the lesser the interfacial tension of droplet. Moreover, the droplet has efficiently trailed along the track of activated electrodes when using the olive oil as the dielectric layer. The olive oil with dielectric permittivity of 3.2 has given the best displacement and high velocity of the droplet transportation. The best low voltage to move the microdroplet between the two planar electrodes is 12 Vpp under the frequency of 10 Hz.

Keyword: Microdroplet; Electrowetting; Flexible device; Aluminium electrode; Paper-based chip